TK
6478
W3

$C 13 926

XE 01963

EXCHANGE

SIGILLVM · VNIVERSITATIS · CALIFORNIENSIS

LVX

FIAT

MDCCCLXVIII

EX LIBRIS

MINISTRY OF PUBLIC WORKS, EGYPT.

EXCHANGE
AUG 23 1922

# MENISCUS MICROPHONES:

## A NEW FORM OF SOUND TRANSMITTER,

BY

E. B. H. WADE, M.A.,

*Director of Research.*

PHYSICAL DEPARTMENT PAPER No. 3.

LIBRARY
OF THE
UNIVERSITY
OF
CALIFORNIA

CAIRO.
GOVERNMENT PRESS.

To be obtained, either directly or through any Bookseller,
from the GOVERNMENT PUBLICATIONS OFFICE, Old Ismailia Palace, Sharia Qasr el ʿAini.

1921.

PRICE: P.T. 5.

EXCHANGE

UNIV. OF CALIFORNIA

MINISTRY OF PUBLIC WORKS, EGYPT.

# MENISCUS MICROPHONES:

## A NEW FORM OF SOUND TRANSMITTER,

BY

E. B. H. WADE, M.A.,

*Director of Research.*

PHYSICAL DEPARTMENT PAPER No. 3.

CAIRO.
GOVERNMENT PRESS.

To be obtained, either directly or through any Bookseller,
from the GOVERNMENT PUBLICATIONS OFFICE, Old Ismaïlia Palace, Sharia Qasr el ʿAini.

1921.

PRICE: P.T. 5.

UNIV. OF
CALIFORNIA

TK6478
W3

EXCHANGE

UNIV. OF CALIFORNIA

# MENISCUS MICROPHONES:

## A NEW FORM OF SOUND TRANSMITTER,

BY E. B. H. WADE.

1. Meniscus microphones belong to the general class of liquid microphones. Such microphones have been described by Bell, Majorana, Vanni, Chambers, and Sykes. In a recent lecture at the Royal Institute, Mr. S. G. Brown refers also to a form of his own. He very kindly showed me his invention in July 1918 and gave me permission to experiment with the idea. I do not feel at liberty to describe either Mr. Brown's invention or the experiments which I made in 1918 and 1919, nor do I know to what extent he may have developed the idea himself. With regard to the meniscus microphone described in the following pages, I must frankly own that I should never have arrived at it unless I had seen Mr. Brown's invention, and I must therefore express my great indebtedness to him for demonstrating that invention to me. On the other hand, it seems clear to me that the principle on which the meniscus microphone acts is quite distinct from that involved in Brown's. The latter does not in fact depend on the properties of menisci at all, whereas such properties are an essential feature of the present invention.

2. A meniscus microphone may be made as follows. The tube J is worked in a flame to the form (a) in Figure I. The tip is then ground down first with a file then with a carborundun stone to the form (b). The corners are then rounded off on the stone to the form (c), though I am not yet certain that this is necessary. One then assembles the apparatus shown in Figure II which describes itself. The whole instrument is mounted on some form of levelling stand and for this purpose an ordinary Morse signalling key is very convenient.

3. Let the terminals of the microphone be connected through, say, 15 volts in series with a milliameter and telephone receiver of 1,000 ohms resistance. As figured, the meniscus M just grazes the nozzle N and therefore the current to get from the liquid in tube J to that in C encounters a high resistance. It is obvious that if the levelling table is tilted by means of the screw S so as to make P rise the orifice will pierce right through the meniscus and there will be no channel from J to C. The milliammeter will read zero. If we tilt far enough in the opposite direction the nozzle is completely immersed and there is easy communication. The milliammeter will be found to read 5 M/A. If a watch W is placed on the base of the instrument, no sound will be heard in the receiver in either of these two cases, but if we now turn S till the nozzle just grazes the meniscus and the milliammeter reads from 2 to 3·5 M/A the watch will be heard very clearly. The adjustment is by no means a fine one.

481496

4. The reason why we hear the watch only at grazing incidence appears to be as follows. The sound vibrations force the plunger P in and out of the liquid in J, just as, in the human ear, it is transferred from the *stapes* to the fluid of the labyrinth, the rubber R paying the part of the annular ligament. With each alternation of high and low pressure, liquid rushes out or in at the orifice O. The result can best be inferred from the diagram in Figure III, which shows that the inthrust of the plunger will increase the depth of the channel along which the current flows and so give an increase of current and vice-versa.

5. Of course if it is desired to reproduce speech with this microphone it is necessary to mount it on a suitable diaphragm. If this is done very good articulation is obtained although certain letters, especially S, are missed. There is good reason for attributing this defect to the diaphragm and not to the microphone proper. The signals may also be amplified by means of valves and they stand such amplification much better than ordinary carbon microphones. The instrument works extremely well and is very reliable. It might have been thought that a meniscus was too tremulous a thing to give uniform signals; that, however, is a matter of diameter. Of course if the meniscus were say three inches in diameter, the instrument could only be used under the sort of conditions that suit a chemical balance. On the other hand there are plenty of conditions where that would not be a serious objection. A meniscus of 12 millimetres diameter is steady enough for mounting on any ordinary table or shelf.

The form which is found most suitable for the transmission of speech is shown in Figure IV. The portion A is made from a telephone receiver by removing the electro-magnet and making an aperture three centimetres in diameter at the back. The funnel B is taken from a commercial microphone transmitter. The instrument is mounted on a wooden tripod stand, and if it goes out of action owing to a blocking of the aperture it is only necessary to rock the tripod gently forwards using C as centre of rotation as indicated by the dotted lines, and the sensitiveness is restored.

Govt. Press 8112-1920-400 ex.

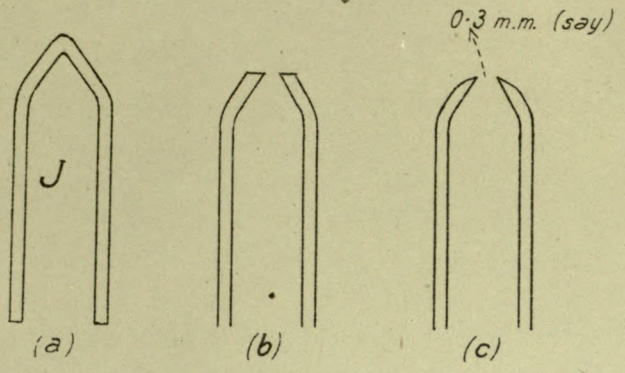



Fig. I.

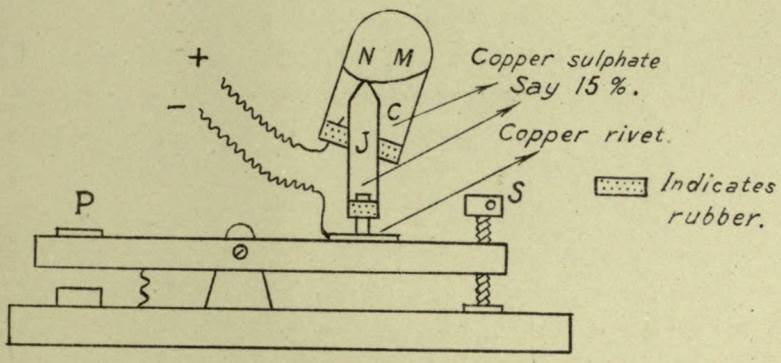



Fig. II.

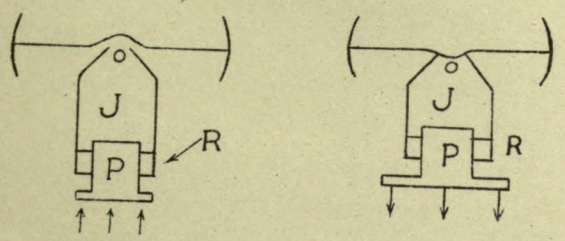



Fig. III.

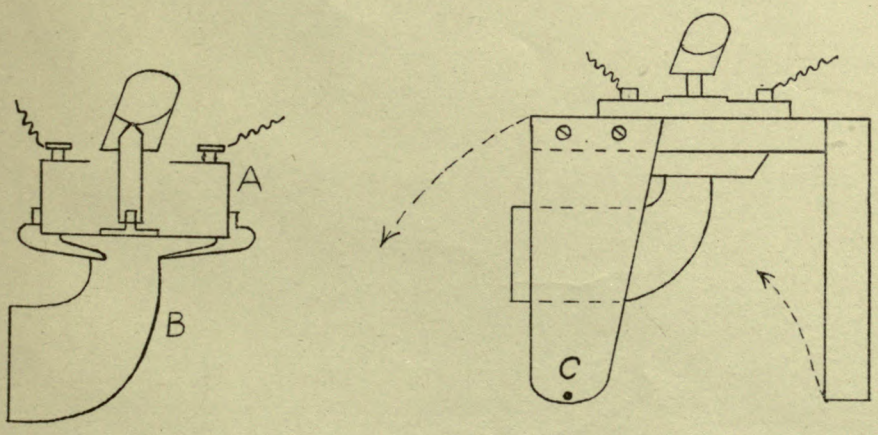
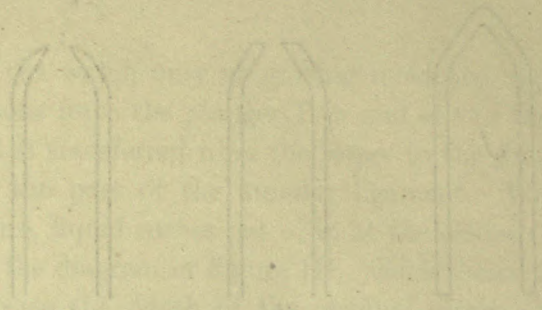
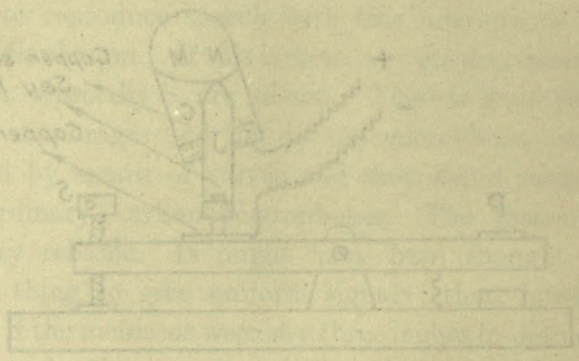
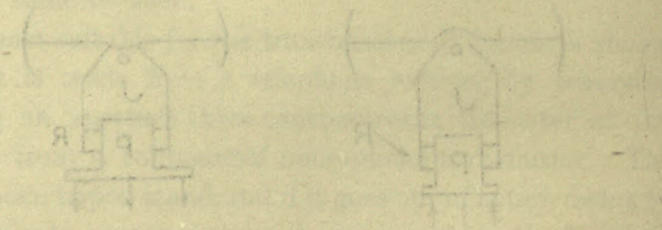


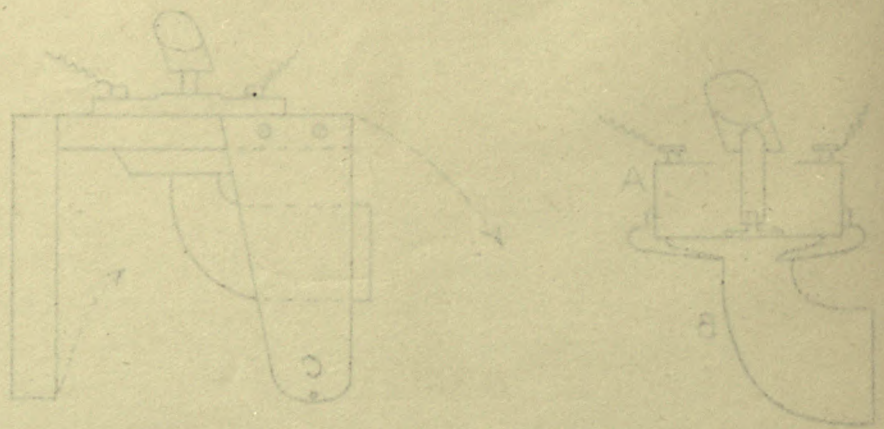

Fig. IV.

S. of E. 21/160









14 DAY USE
RETURN TO DESK FROM WHICH BORROWED

LOAN DEPT.

This book is due on the last date stamped below, or on the date to which renewed.
Renewed books are subject to immediate recall.

12May'60VT
REC'D LD
APR 28 1960
26May'60VD
REC'D LD
MAY 12 1960

LD 21A-50m-4,'60
(A9562s10)476B

General Library
University of California
Berkeley

YE 01963

481496 TK6472
W3

UNIVERSITY OF CALIFORNIA LIBRARY